HOW TO FIGURE ILLUMINATION

—also a complete catalog of—

Western Electric SUNBEAM MAZDA LAMPS

SIXTH EDITION

"Nature Smiles through Sunbeams"

HOW TO FIGURE ILLUMINATION

THE purpose of this booklet is to make clear a thoroughly practical and easy-to-apply method of designing illumination to meet any lighting requirements. Technicalities have been omitted as far as possible, the thought having been to treat the subject in a plain, simple, yet comprehensive way for the benefit of those who have not made a special study of illuminating engineering.

Furthermore, it is believed that if the data given in subsequent pages of this booklet be employed with good common sense, it will prove sufficient to enable anyone to design a proper lighting system for any area, provided the calculations do not become complicated because of architectual restrictions.

Preliminary Considerations

In order to figure illumination correctly, it is necessary to have on hand data as to the following:

1. Area of surface to be illuminated.
2. General color tone of the room. This is determined by the color of the ceiling and walls, also by that of the furnishings and other objects present.
3. Purpose for which the light is to be employed.
4. Height of ceiling.

Obviously, a room with a floor area of 240 square feet will require just twice as much light to illuminate it to a stated intensity, as one occupying an area of 120 square feet, providing the two rooms are similar in other respects.

On the other hand, if one were to install precisely similar lighting equipment in two rooms of the same dimensions but having different colored walls, the intensity of illumination would again vary. Light falling upon any surface is part reflected and part absorbed. The light which is reflected goes to assist in the illumination of other objects but that which is absorbed is lost. In rooms of dark color tone the loss of light by absorbtion is large, hence, more light must be provided to illumniate them to a given intensity.

In calculating illumination one must also consider the purpose for which the light is to be employed. For example, a higher intensity is desirable for the display of merchandise than for the handling of goods in warehouses. What is generally considered among illuminating engineers as the correct intensities of illumination for various classes of service, are given in Table A immediately following.

Table A

Foot-Candle Intensities Recommended for Various Classes of Service

Arcade (in addition to light received from show windows)	1.00
Armory or Drill Hall	2.0
Art Gallery (walls)	5.0
Auditorium	2.0
Automobile Showroom	5.0
Automobile (interior)	1.0
Ball room	2.0
Bank	3.0
Bar room	3.0
Barber shop	3.0
Bath (public)—	
Dressing rooms	1.0
Swimming pool	2.0
Billboard	8.0
Billiard room (general)	.8
Bliliard table	5.0
Bowling alley—	
Alley	1.5
Pins	4.0
Cafe	2.5
Card room	2.0
Carpenter shop	2.5
Cars—	
Baggage	1.0
Day coach	2.0
Dining	1.8
Mail	7.0
Pullman	2.0
Street	2.0
Courts—	
Handball	7.0
Squash	7.0
Tennis	7.0
Court room	2.0
Church	2.0
Club—	
For various rooms, see Bath, Hotel, Residence, etc.	
Dance hall	2.0
Depot (waiting room)	1.5
Desk	4.0
Drafting room	8.0
Engraving	10.0
Factory—	
General illumination only, where additional special illumination of each machine or bench is provided	1.5
Local bench illumination	4.0
Complete (no local illumination)	4.0
Fire Stations—	
When an alarm is turned in	3.0
At other times	1.0
Foundry	3.0
Garage	2.0
Gymnasium	2.5
Hall—	
See Auditorium, Corridor of Hotel or Office Building.	
Hospital—	
Corridors	.5
Wards (with no local illumination supplied)	1.5
Wards (with local illumination supplied)	.5
Operating table	15.0
Hotels—	
Lobby	2.0
Dining room	2.0
Writing room	2.0
Corridor	.6
Bed room	1.5
Laboratory	3.0
Laundry	2.0
Library—	
Stack room	1.5
Reading room (with no local illumination supplied)	3.5
Reading room (with local illumination supplied)	.7

Lodge room	2.5
Lunch room	2.0
Machine shop (general)	1.0
Market	3.0
Moving-picture theater	1.5
Museum	3.0
Office	4.0
Opera House— See Theatre.	
Pattern shops	3.0
Pool room (general)	.8
Pool table	5.0
Power house	2.5
Postal service	7.0
Press room	4.0
Public square	.8
Reading (ordinary print)	2.0
Reading (fine print)	2.5
Residence—	
Porch	.2
Porch (reading light)	1.0
Hall (entrance)	.7
Reception room	1.5
Parlor	1.5
Sitting room	1.5
Library	2.0
Music room	2.0
Dining room	1.5
Pantry	2.0
Kitchen	2.0
Laundry	1.5
Hall (upstairs)	.5
Bed room	1.5
Bath room	2.0
Furnace room	.7
Store room	.7
Restaurant	2.0
Rink (skating)	2.0
Rug rack	15.0
Saloon	3.0
School—	
Class room	3.0
Study room	3.0
Assembly room	2.0
Office	2.5
Cloak room	.8
Corridor	.8
Manual training	3.0
Laboratory	3.0
Drawing	5.0
Sewing (light goods)	4.0
Sewing (dark goods)	8.0
Shipping room	1.5
Show window—	
Light goods	12.0
Medium goods	24.0
Dark goods	30.0
Sign	8.0
Stable	1.0
Station (railroad)	2.0
Stereotyping	4.0
Stock room	1.0
Store—	
Art	4.0
Baker	3.0
Book	3.5
Butcher	3.5
China	2.5
Cigar	3.0
Clothing	5.0
Cloak and suit	5.0
Confectionery	3.0
Decorator	3.0
Department (see each department)	
Drug	3.0
Dry goods	4.0
Florist	3.0
Furniture	3.0
Furrier	5.0
Grocery	3.0
Haberdasher	5.0
Hardware	4.5
Hat	4.0
Jewelry	3.5
Lace	3.0
Leather	3.5
Meat	3.5
Men's furnishings	5.0
Millinery	4.0
Music	3.0
Notions	3.0
Piano	4.0
Post cards	3.0
Shoe	3.5
Stationery	3.5
Tailor	4.0
Tobacco	3.0
Street—	
Business (not including light from show windows and signs)	.5
Residence	.1
Prominent (in residence districts)	.2
Country roads	.15
Studio	4.0
Telephone exchange (general)	3.0
Theatre—	
Lobby	3.0
Auditorium	2.0
Train sheds	1.0
Typesetting	8.0
Warehouse	1.5
Wharf	1.0
Y. M. C. A. (See Clubs.)	

i.e., the lumens per lamp reaching the plane to be lighted, the number of lamps is determined.

$$\text{Number of Lamps} = \frac{S \times I}{L \times U}$$

where

S=Area to be lighted.

I=Intensity of illumination desired.

L=Total lumens provided by the size lamp used.

U=Utilization factor depending upon conditions.

The size of the units employed is somewhat a matter of choice, six 400 lumen units being equivalent in illumination power to four 600 lumen units. In deciding upon the proper size of lamp to use, one must consider the appearance of the units, the spacing of present outlets, if the building is already wired, and the location of pillars, beams, etc. In general, the smallest number of units, consistent with good light distribution will prove the most economical, since the total cost of outlets, fixtures and lamps, as well as the maintenance charges, will be kept at a minimum. On the other hand, the use of smaller—more—units will give better distribution. Individual conditions and performances should govern to a large extent.

Choice of Reflector

Reflectors in general fall into one of four classes according to their light distributing qualities—Extensive, Intensive, Focusing and Concentrating.

Where the light from a single lamp must be spread over a relatively great area, it is advisable to use an Extensive form of reflector. This reflector is applicable to general residence lighting; to store lighting where a single row of lights must illuminate a narrow area and the shelves and walls as well; also to uniform lighting of large areas where low ceiling or widely spaced outlets demand a wide distribution of light.

Where the area to be lighted by one lamp is smaller, the Intensive reflector is used. Such cases include brilliant local illumination, as for a card table; single-unit lighting of rooms with high ceilings such as pantries; and uniform lighting of ballrooms, restaurants and the like. In the latter case, the units are placed in squares and suspended at the height obtained from Table D.

Where an intense light on a small area directly below the lamp is desired, a Focusing reflector is used. The diameter of the circle thus intensely lighted is about one-half the height of the lamp above the plane considered. Focusing reflectors are largely used in show windows, high narrow vestibules and other rooms of unusual height of ceiling.

For special cases a reflector giving a more concentrating distribution than the Focusing reflector is sometimes required and for these cases the Concentrator should be used.

Table D

Spacing of Units for Uniform Illumination

Clear Holophane Reflectors, Type	Height above Plane to be lighted
Extensive	1/2 D
Intensive	4/5 D
Focusing	4/3 D
Concentrating	2 D

D=Distance between units=Side of square, when units are placed in squares=Average side of rectangle, when units are placed in rectangles.

EXAMPLE

To illustrate how Tables A, B and C may be used, let us take the case of a store 21 feet wide, 60 feet long with a ceiling 14 feet high. We will assume the store is to be used for men's clothing, and has medium colored walls and a light ceiling. From Table A we find that approximately 5 foot-candles are required.

From Table C we find that with clear Holophane Prismatic glass reflectors 50% of the lumens given in Table B will be effective under these conditions. Let us first assume 300-watt Western Electric Sunbeam MAZDA lamps. Substituting in the formula, we have—

$$\text{Number of Lamps} = \frac{21 \times 60 \times 5}{4310 \times 0.50} = 3 \text{ approx.}$$

Or, if we assume 100-watt MAZDA C lamps our formula will be,

$$\text{Number of Lamps} = \frac{21 \times 60 \times 5}{1257 \times 0.50} = 10 \text{ approx.}$$

Thus we find we might use either two rows of 5 lamps to each, or a single row of 3 lamps down the center of the store.

If we use the 10 lamps, we will have a somewhat better light distribution and the units will be placed in the center of rectangles, 12′ x 10½′, as shown in the following sketch:

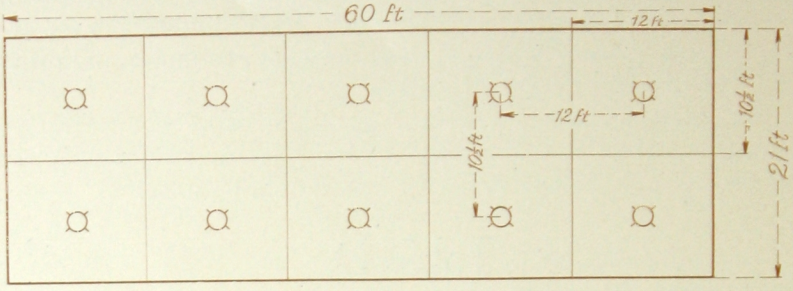


Fig. 1—Plan Showing the Proper Position of the Outlets.

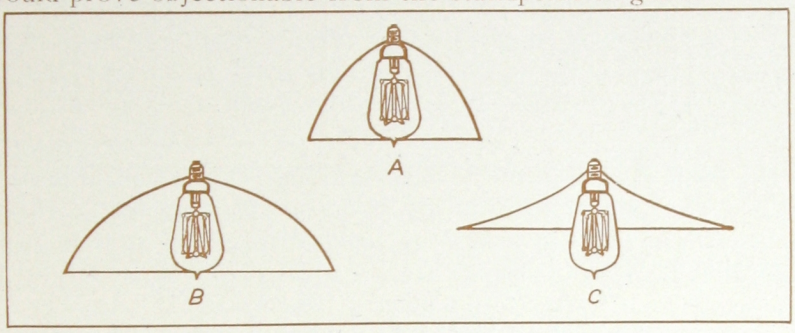
From Table D, we find that with lamps spaced an average of 11 feet apart, the height of the units above the floor should be as follows: If extensive reflectors are to be used, 5½ ft.; intensive reflectors, 9 ft.; and focusing reflectors, 15 ft. As the ceiling height is 14 ft. it is quite evident that intensive reflectors at a height of 9 ft. will give a better appearance than the extensive line with an 8½ ft. drop. It is also evident that the ceiling is not high enough to use the focusing type of reflector. Therefore the lamps should be equipped with intensive reflectors and suspended 5 ft. from the ceiling.

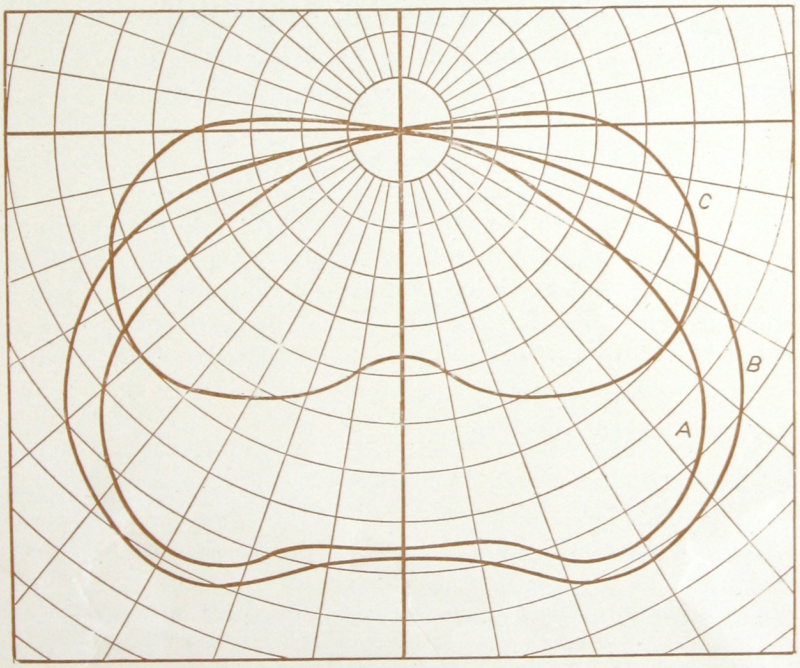
Industrial Lighting

Enamel and Aluminum finish steel reflectors which have proved the most satisfactory for industrial lighting may be divided into three classes, the flat, dome-shaped and bowl-shaped. In Fig. 2 are given distribution curves and photometric data for these three typical reflectors. As shown in curve C, the flat reflector gives the most extensive distribution of light, but has only a limited application, since light emitted just below the horizontal usually has no more value in an industrial plant than the light emitted upwards. Furthermore, it is the light rays near the horizontal which are most troublesome in causing glare. Reflector A resembles a parabola in shape with the lamp so placed as to obtain the greatest degree of concentration, and the angle of cut off is considerably smaller than for B. While the maximum intensities produced by A and B are practically identical, the efficiency of B in the 50 degree and wider zones is considerably higher than the corresponding value for A. Curve A, so far as distribution in the lower hemisphere is concerned, is practically ideal for industrial lighting purposes where the lamps are suspended at usual heights. This reflector tends toward a uniform illumination on the work and screens the lamp filaments. On the other hand, it must be remembered that the wider reflector, B, Fig. 2, will in practically all cases supply 10 or 15

per cent more useful light than can be obtained from the bowl-shaped unit. Furthermore, the shadows resulting from the use of a light source of large diameter, such as B are less sharp than those from A.

From a study of all of the factors involved it appears that the use of a bowl-shaped porcelain or aluminum finish steel reflector similar to A may properly be recommended where the location and mounting height of units is such that reflector B would prove objectionable from the standpoint of glare.





PERCENTAGE LIGHT FLUX

Unit	A	B	C
Total light from lamp	100.00	100.00	100.00
Light absorbed by reflector	37.0	18.6	14.8
Light in upper hemisphere	0.0	0.0	6.4
Light in lower hemisphere	63.0	81.4	78.8
Light in 60° zone	53.4	59.2	41.3

Fig. 2—Typical Steel Reflectors.

Table E

UTILIZATION EFFICIENCIES

INSTALLATION—UNITS SPACED 1.5 to 1.6 Times Height Above Work	REFLECTOR	
	Enameled Steel Dome	Enameled Steel Bowl
1 Unit	28	24
1 Row of 5 Units	42	36
2 Rows of 2 Units	48	41
2 Rows of 3 Units	52	44
3 Rows of 3 Units	56	47
3 Rows of 4 Units	60	49
4 Rows of 4 Units	63	51
4 Rows of 8 Units	67	54
8 Rows of 8 Units	71	57

In Table E are given the values of a number of typical installations of dome and bowl-shaped units. By the use of these constants the number of units required for lighting an industrial plant may be obtained by the same method as previously outlined.

Display Window Lighting

In the carefully lighted store window, the light is directed on the goods displayed and not into the eyes of the observer on the street. If possible, the light sources should be concealed or at least out of the ordinary range of vision.

It has, therefore, come about in good practice to place the lighting units close to the glass and comparatively high up in the window. The height will vary according to the type of window construction. Under average conditions the transom bar will be sufficiently high to permit the lamps being located directly behind it. In this position they can be screened from view by means of a short curtain or painted sign.

UNIT TO EMPLOY

Later are shown two Holophane Prismatic glass reflectors which if employed with Western Electric Sunbeam 100-watt MAZDA lamps will give excellent window lighting results. They meet all requirements.

The new No. 983 reflector is radically different from any other on the market, being a prismatic reflector of the angle type. It is so designed that when hanging pendant, it throws a powerful stream of light down and back into the window, the greatest intensity of illumination being at 40° from the vertical; while between the angles 0° and 40° the average intensity is 700 candle-power.

Reflector No. 963 is similar to No. 983, but without the V point. It serves better for very shallow windows. On the other hand in exceptionally deep windows the best results can be had by tipping the No. 983 unit at an angle of 15° inward.

Fig. 3 is a chart which shows which type to use in a given window. It represents in section from front to back all windows of ordinary dimensions. In using it locate the horizontal line corresponding to the height of the window you are going to light, and the vertical line corresponding to its depth. The points where these two lines meet (which represents the upper back corner of the window) is in the section of the chart marked with the correct installation to employ.

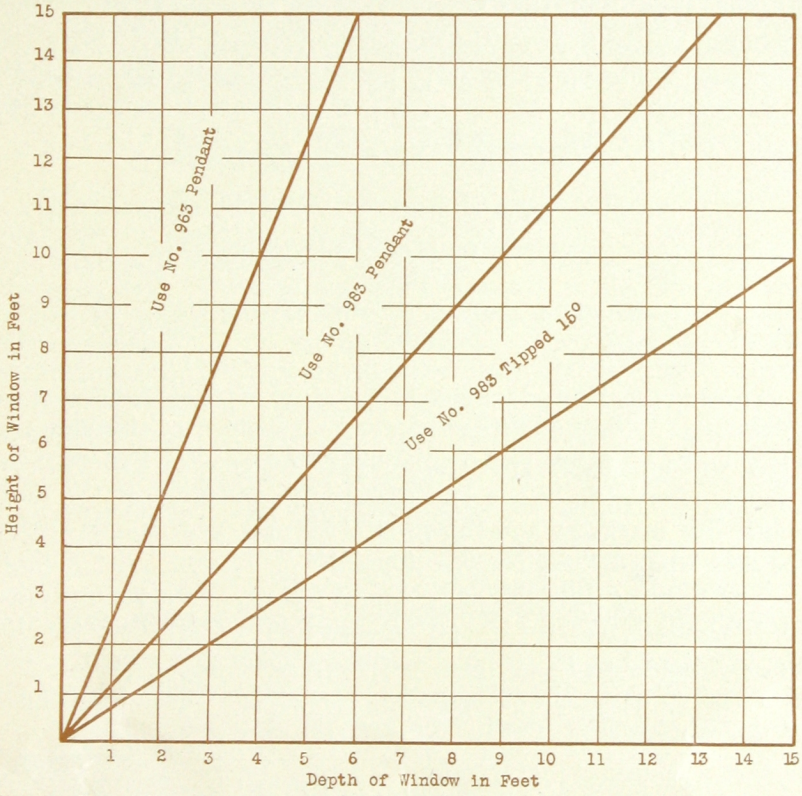


Fig. 3—Chart Showing Proper Reflector to Use with 100-Watt MAZDA C Lamp for Show-Window Lighting, with Lamps Located at Ceiling, at Front of Window

INTENSITY OF ILLUMINATION

The amount of light to employ depends upon the size of window, the class of goods displayed, the color tone of the window trimmings and the store location.

Windows displaying dark colored goods and with dark trimmings require a high intensity of light because of light absorption. Stores in a brightly lighted retail district must have the greatest brilliancy in their windows.

As a general rule allow from 5 to 15 watts per square foot of floor area, depending upon how brightly you desire the illumination to be.

EXAMPLE

Let us consider the lighting of a dry-goods window in which the merchandise and general color tone of the window itself, is medium. Let us further assume that the window is 15 ft. long, 9 ft. deep and 10 ft. from the floor to the transom bar. Since the color tone is medium, choose 10 watts per square foot as a basis in determining the number of Western Electric Sunbeam 100-watt MAZDA C lamps to use.

$$\text{Area of window floor} = 15 \times 9 = 135 \text{ sq. ft.}$$

$$\text{Total wattage required} = 135 \times 10 = 1350$$

$$\text{Number of lamps} = \frac{1350}{100} = 13 \text{ approx.}$$

The window being fairly deep, the lamps may be located close to the glass along the front and entrance sides of the window. They will be spaced approximately 22 in. apart. Referring to window chart, Fig. 3, we find that the intersection of the horizontal line marked 9 and the vertical line marked 10 falls within the area labeled, "Use No. 981 tipped 15°."

The lighting installation of this window, therefore calls for 13, 100-watt MAZDA C lamps equipped with Prismatic reflector No. 981 tipped at 15° from the window glass and mounted, one every 22 in. along the transom bar across the front and one end of the window.

General

In illuminating problems—indoors or outdoors—of a special nature, where the foregoing rules and tables cannot be applied, we would like our customers to consider our illuminating engineering experts at their disposal. Such service will gladly be rendered without charge.

The figures given in this handbook are based on Western Electric Sunbeam MAZDA drawn wire filament lamps and Holophane Prismatic glass reflectors (prismatic glass) for commercial usages and Ivanhoe steel reflectors for industrial lighting. There are several makes of steel reflectors on the market, by the use of which practically the same results will be attained. We have referred to and listed Ivanhoe and Holophane lines as they are representative.

Development

The Western Electric Sunbeam MAZDA lamp embodies the most recent and important developments in high efficiency metal filament lamps. It represents the composite result of research work and manufacturing experience of the laboratories and factories of the most important lamp manufacturers and inventors in the world.

Mazda B and Mazda C

Until the fall of 1913 all Western Electric Sunbeam MAZDA lamps were of the vacuum type, i.e., their filaments operated in bulbs from which practically all the air had been removed in the course of their construction. The vacuum served the double purpose of minimizing energy losses and preventing oxidation of the filament. With the development of the helically coiled filament, which could be concentrated into a small space at the center of the bulb, it was found that if such filaments were operated in an atmosphere of inert gas, the reduction in the rate of evaporation of the filament permitted operation at a temperature which increased the volume of light to an extent that more than offset the disadvantage of increased energy loss through conduction and convection by the gas. The gas-filled lamps first to appear on the market were rated at 1000 and 750 watts—sizes which were not manufactured in vacuum lamps. These were followed by lamps of 500 and 400 watts and the gas-filled and vacuum sizes overlapped. When the 300, 200 and 100-watt gas-filled lamps appeared it became necessary to distinguish between the two constructions; hence the vacuum lamps were designated as MAZDA B lamps, and the gas-filled as MAZDA C lamps.

Adaptability

Western Electric Sunbeam MAZDA lamps will burn satisfactorily in any position—upright, pendant, horizontal or at an angle.

The regular types may be had small enough to fit any fixture or reflector suitable for the old time 16 candle-power lamp, while for lighting large areas Western Electric Sunbeam MAZDA C

lamps delivering as high as 1665 candle-power are available. Besides the regular types are supplied the round, tubular and showcase lamps, adapted to special conditions.

Durability

All Western Electric Sunbeam MAZDA lamps are built with drawn wire tungsten filaments, insuring unequaled stability and ruggedness. We recommend them for practically all classes of service. They are being used with entire success on steam railroads, electric railways, steamboats, factories, mines, etc., where there is considerable vibration.

Quality of Light

Western Electric Sunbeam MAZDA lamps have enabled the public to obtain light more nearly approaching daylight in color than has ever been possible before with incandescent electric lamps. In general it is desirable that artificial light should approximate daylight in color. This is particularly true for commercial purposes requiring that colors shall have the same relative appearance by artificial light as by daylight. As examples may be mentioned: Art Galleries, Studios, Dental and Surgical Offices, Laboratories, Jewelry, Dry Goods, Clothing, Stationery, Book and Haberdashery Stores, Show Windows and Textile Factories.

Economy and Cost

Western Electric Sunbeam MAZDA lamps give from three to six times as much light as the ordinary carbon lamp according to size. Furthermore, the life is longer than that of the carbon lamp and the brilliancy decreases much less during life.

The cost of installation, depreciation and operation of Western Electric Sunbeam MAZDA lamps is decidedly low as compared with other forms of illuminants—those having mechanical parts and magnetic coils. There are no installations of the latter type now employed in this country which have been in use for 7 or 8 years that are not already obsolete. Although the lamps may be in good operating condition, economy demands that they be replaced by more efficient illuminants. There is every indication that the next few years will see even greater progress in the development of incandescent lamps than has been true of the industry as a whole the past few years. We desire therefore to impress upon you the fact that the permanent parts of a MAZDA installation are adapted for the use of any higher efficiency types of lamps should any such be produced. Therefore there is no likelihood of there being any loss due to the replacement of the permanent parts of a MAZDA installation by some newer form of illuminant.

Mazda B and Mazda B Coil Lamps

STRAIGHT SIDE TYPE

Volts	Size of Lamp in Watts	Efficiency in W.P.C.	Style of Bulb	Diameter in Inches	Length over all in Inches	Base Regularly Supplied	Standard Package Quantity
105 to 125	10	1.25	S-17	2⅛	4⅝	Med. Screw	100
	15	1.10	S-17	2⅛	4⅝	" "	100
	20	1.07	S-17	2⅛	4⅝	" "	100
	25	1.05	S-19	2⅜	5¼	" "	100
	40	1.03	S-19	2⅜	5¼	" "	100
	60	1.00	S-21	2⅝	5½	" "	100
220 to 250	25	1.20	S-19	2⅜	5⅛	Med. Screw	100
	40	1.12	S-19	2⅜	5⅛	" "	100
	60	1.10	S-21	2⅝	5⅞	" "	100
	100	1.00	S-30	3¾	7⅞	Med. Sc. Sk.	24
	150	1.00	S-35	4⅜	8¾	" "	24

MAZDA B COIL

105 to 125	25	.....	S-19	2⅜	5¼	Med. Screw	50
	40	.....	S-19	2⅜	5¼	" "	50
	60	.....	S-21	2⅝	5½	" "	50

ROUND BULB TYPE

105 to 125	15	1.15	G-25	3⅛	4¾	Med. Screw	50
	25	1.05	G-25	3⅛	4¾	" "	50
	40	1.03	G-25	3⅛	4¾	" "	50
	60	1.00	G-30	3¾	5½	" "	24
	100	0.95	G-35	4⅜	7¼	Med. Sc. Sk.	24
220 to 250	25	1.20	G-25	3⅛	4¾	Med. Screw	50
	40	1.12	G-25	3⅛	4¾	" "	50

SPECIAL TYPES

105 to 125	25 Tubular	1.05	T-10	1¼	5⅞	Med. Screw	100
	25 and 40 Showcase (Tubular)	.....	T-8	1	12	" "	50
	100 &*250 Concentrated Filament		G-30	3¾	5½	" "	24
	7½ Sign	1.50	S-14	1¾	4	" "	100
	10 Sign	1.30	S-14	1¾	4	" "	100

*MAZDA C

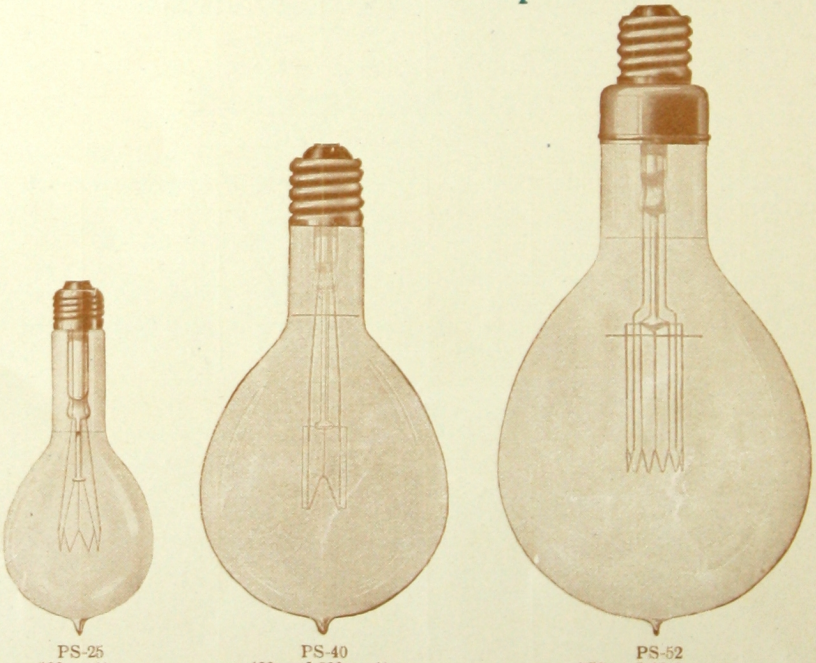
Mazda C Lamps

PEAR SHAPE TYPE

Volts	Size of Lamp in Watts	Efficiency in W. P. C.	Style of Bulb	Diameter in Inches	Length over all in Inches	Base Regularly Supplied	Standard Package Quantity
105 to 125	100	1.00*	PS-25	3⅛	7⅛	Med. Screw	24
	200	0.90*	PS-30	3¾	8⅜	Med. Sc. Sk.	24
	300	0.82*	PS-35	4⅜	9¼	Mog. Screw	24
	400	0.82*	PS-40	5	10	" "	12
	500	0.78*	PS-40	5	10	" "	12
	750	0.74*	PS-52	6½	13⅜	Mog. Sc. Sk.	8
	1000	0.70*	PS-52	6½	13⅜	" " "	8
220 to 250	200	1.00*	PS-30	3¾	8⅜	Med. Sc. Sk.	24
	300	0.92*	PS-35	4⅜	9¼	Mog. Screw	24
	400	0.90*	PS-40	5	10	" "	12
	500	0.85*	PS-40	5	10	" "	12
	750	0.82*	PS-52	6½	13⅜	Mog. Sc. Sk.	8
	1000	0.78*	PS-52	6½	13⅜	" " "	8

*Watts per Spherical Candle-power.

Mazda C Lamps



PS-25
100 watts
105-125 volts

PS-40
400 and 500 watts
105-125 volts
220-250 volts

PS-52
750 and 1000 watts
105-125 volts
220-250 volts

Mazda B Straight Side Types

10-15-20 watt
105-125 volts

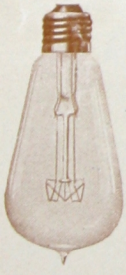
25 and 40 watt
105-125 volts
220-250 volts

60 watt
105-125 volts
220-250 volts

100 watt
220 250 volts

150 watt
220-250 volts

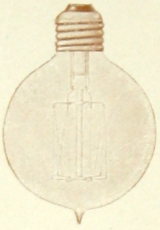
Mazda B Coil



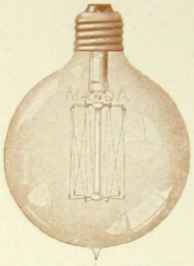
25 and 40 watt
105-125 volts

60 watt
105-125 volts

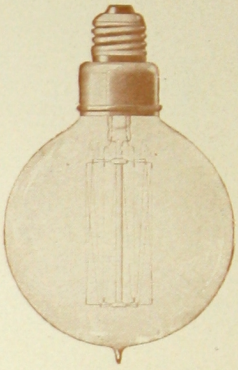
Mazda B Round Types



15, 25 and 40 watt
105-125 volts
25 and 40 watt
220-250 volts



60 watt
105-125 volts

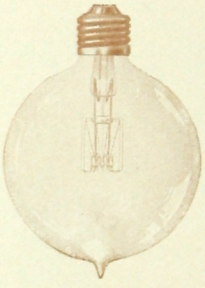


100 watt
100-130 volts

Mazda B Special Types

Tubular

25 watt
105-125 volts



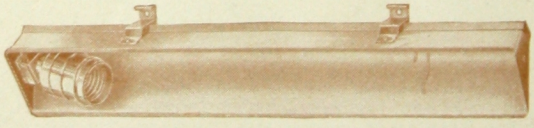
100 watt
Concentrated Filament
(for Stereopticons, Projectors,
Flood Lighting, etc.)

Sign

7½ and 10 watt

Show Case Lamp and Reflector

25 and 40 watts
100 to 130 volts



HolophanePrismatic"Extraficiency"Reflectors

Extensive Type–XE

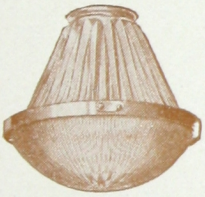
Focusing Type–XF

Intensive Type–XI

No. 963
Window Lighting

Reflector Bowl
No. 04500 S. B.
For 100 watt Mazda C Lamp

No. 983
Window Lighting



No. 2073

No. 2072 S. B.

Efficiency Types of Opal Glass Reflectors

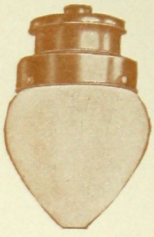
No. 3024 Druid
Bowl Type

No. 01129 Veluria
Shallow Type

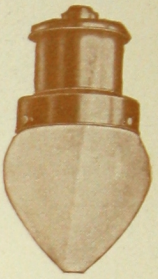
No. 01213 Sudan
Bowl Type

Ivanhoe Fittings for Mazda C Lamps

No. 750

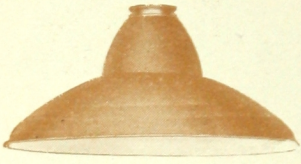


No. 754

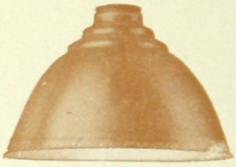


No. 756

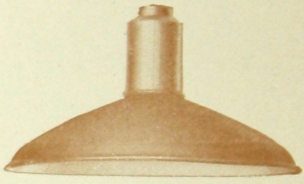
Ivanhoe Metal Reflectors and Holders



No. BED-1000
Distributing Type



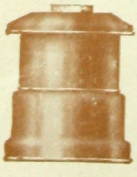
No. BEE-1000
Extensive Type



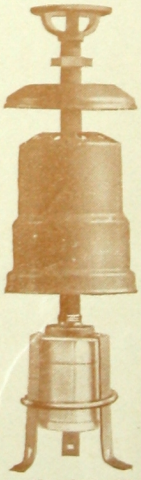
Nos. 18181, 18183 and 18185
Distributing Type

Nos. AI-40, AI-60
AI-100
Intensive Type

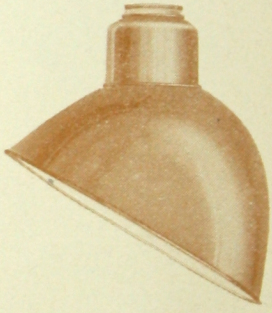
Nos. AE-40, AE-60
AE-100
Extensive Type



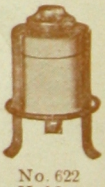
Nos. 635 and 672
Holder



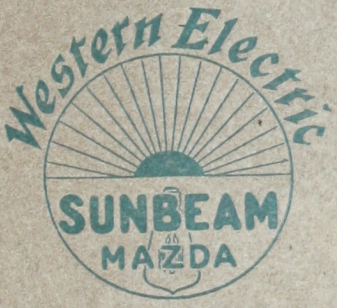
Illustrating how Holder
No. 672 is Fastened to
½ inch Pipe and Taken
Apart for Wiring



No. BEL-1000
Angle Type



No. 622
Holder



The quality goes in before the Label goes on
and has for more than a generation.

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